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Women in Academia

A study of the hiring decision in departments of physical science.

Arie Y. Lewin and Linda Duchan

Recently, there has been a great deal of concern over the role of women in today's society. There have been numerous allegations of discrimination against women in many areas, especially in certain occupational and professional fields. A significant part of the controversy has involved alleged bias against women in academia.

Charges of discrimination against women in universities have been made both formally and informally. In the former category, Gruchow (1) cites 43 colleges and universities which have been charged with discriminatory policies against women under laws which call for the cancellation of federal contracts held by the schools. Bikman (2) investigated charges of discrimination at Columbia University and noted that women are admitted to the school and trained, but not hired; the few positions they do obtain are at levels relatively lower than those offered to men. Harvard University has been particularly singled out by women's rights groups for discriminatory practices (3). Informal or subjective evidence has also been widely publicized. Alexander (4)

obtained evaluations of bias against women by female faculty members at Johns Hopkins University: they described the discrimination they experienced as being in the form of "unseen pressure." There are numerous other anecdotal accounts highlighting the alleged existence of discrimination against female faculty members (5).

Perhaps the most conspicuous discrimination is evident from salary differentials between men and women. Alexander reports that salaries for women employed in higher education are generally lower (3). Bayer and Astin concluded that salary disparities between men and women exist in academia across all ranks, work settings, and fields of specialization (6). Furthermore, a recent report in the field of chemistry indicates that "obvious differences in the earnings of men and women chemists" exist; these differences seem to carry over time, rather than being clustered in the earlier years of employment (7).

Even more illuminating are the statistics which show that women are being discriminated against in the awarding of research grants. In the Senior Postdoctoral Fellowship competition recently held by the National Science Foundation, 14 of the 395 applicants were women. Fifty-four grants were awarded—none went to women.

In a pilot study of grants and awards given by the National Science Foundation to university researchers in a physical science discipline for the years 1964–1968, women were only awarded less than 0.03 percent of the grants although they comprise 5 to 8 percent of the scientists in the discipline. Furthermore, the mean dollar value of the awards received by women was smaller than that of those received by men. For the same discipline, however, no similar discrimination was observed in the awarding of grants by the National Institutes of Health (8). The American Chemical Society does not have a much better record: although no national award prohibits female applicants, the only one which has gone to a woman (with the exception of the Garvan Medal which is restricted to women) is an award in high school chemistry teaching (9). Similarly, out of the 827 Sloan Research Fellowships that have been awarded by the Alfred P. Sloan Foundation over the past 16 years, only one or two women were among the recipients.

Other inequalities facing women in academia have also been charged. Lack of job opportunities and fewer advancements are often cited (10). Other research has indicated that psychological and social barriers exist for women, especially in science. Specifically, White (11) concluded that it is difficult for women to attain "challenging interaction" with male colleagues, that men are hesitant about sponsoring women as protégés, and that women are denied the informal signs of recognition and belonging.

Perhaps the key to the problem may be found in the analysis of cultural influences. The dominant attitudes and norms concerning the role of the woman in our society are perceived to be incompatible with the concept of a successful professional woman. In the socialization process, children are conditioned as to which traits and professions

The authors are, respectively, associate professor of behavioral science and management and research assistant in management and behavioral science at the Graduate School of Business Administration, New York University, New York. This article is based on a paper given at the Women in Science Symposium during the 137th annual meeting of AAAS, Chicago, Illinois.

are "masculine" and which are "feminine." Simmons alludes to this indoctrination that starts in and continues throughout the school years (12). Bird stresses some specific attitudes internalized by girls in our society, including the notion that it is wrong for them to excel over boys in school, and the traditional idea that "the real business of life is attracting a desirable husband" (5). Rossi highlights the different concerns parents express for their adolescent children—educational goals of their sons and dating patterns of their daughters (13). Graham points out the ambivalences in young women who are socialized into feeling that they must devote themselves to the affirmation of their femininity, rather than to preparation for a professional career. She further maintains that "women's low expectations for themselves so infect the society that both men and women refuse to think of women as generally likely to occupy important posts" (14). Finally, the attitudes concerning particular professions may deter women from training for them. The National Manpower Council reports that some qualified young women will not prepare for science and engineering, perceiving that these are "men's professions" (15). Similarly, Bernard concludes that the apparent discrimination against women is a result of the discrepancy between the supply of qualified women and the demand for them. She asserts that the demand for qualified women exists, but due to sociocultural influences working against women preparing for "masculine" careers, the supply is not sufficient (16).

Statement of the Problem

Previous studies have reported on bias against women already employed in academia; to our knowledge, however, there have been no studies of the discrimination which may occur at the time of hiring. Our study, therefore, focuses on possible discrimination at the time of the hiring decision.

The study involved the chairmen of all (179) graduate departments of a physical science discipline in American colleges and universities (17). Four different versions of a standardized résumé were constructed. In all cases, the applicant was married with two children and had held the title of assistant professor for 4 years. The undergraduate education was also identical for

each applicant. The implied differential quality of graduate education—doctoral and postdoctoral training—was achieved by varying the universities attended; the better the implied graduate education, the better known the institutions involved. Research output was varied through the number of publications, the journals in which they appeared, and invited addresses at symposiums. The number and size of grants and awards were similarly treated. Finally, the higher the quality of the applicant, the greater was the prestige of the currently employing institution.

Two versions of an "average" quality résumé were used; they were identical except that one belonged to a female applicant, the other to a male. The third, an "excellent" résumé, was improved in all categories, and belonged to a woman. The final, a "superior" résumé, showed a female applicant outstanding in all areas. Our hypotheses were: (i) If bias exists after a woman has already been hired, it should also be evident at the time of the hiring decision, particularly when a woman is in competition with a male applicant. (ii) Specifically, department chairmen would exhibit preference for a male applicant over a female applicant with identical qualifications. (iii) Department chairmen would be less biased when considering an average male applicant with a superior female applicant.

The chairmen were randomly assigned to four groups, corresponding to the four different résumés. Each chairman was sent a résumé and a questionnaire on which to record his reactions to the résumé. The chairman was instructed to assume that there was an opening in his department for an associate professor, a position which could ultimately lead to tenure. He was further told to assume that the résumé was sent from a highly regarded colleague and that, as chairman, he was in a position to act on it.

The questionnaire was divided into two basic parts. The first section called for specific reactions to the résumé and information on factors involved in the hiring decision. The chairmen were asked to state their overall impressions of and inclination to hire the applicant. They were further asked to evaluate the applicant regarding the factors of age, educational background, and ability to attract research grants. Finally, they were asked if they would have responded differently had the résumé not

come from a trusted colleague. Each chairman recorded his responses to the questions on a Likert-type five-point scale which ranged from excellent to unsatisfactory. The second section of the questionnaire was aimed at getting background information for further classification of the data. It consisted of similarly scaled items concerning the chairman and makeup of the department faculty, as well as open-ended questions concerning the criteria and practices generally involved in hiring decisions.

Analysis of Results

One hundred and eleven (62 percent) of the questionnaires were returned, evenly distributed among the four groups in the survey population. Significance of differential ratings was measured by means of chi-square tests. The data was first submitted to an overall analysis comparing responses to each of the four résumés, and then further classified and analyzed under six headings: size of the full-time faculty; presence of women on the faculty; age of the chairman; length of time as chairman; geographical location of the school; and relative quality ranking of the institution. The analysis of results, however, is based on the responses to the average (male and female) and excellent (female) résumés only. This is because the superior female applicant had postdoctoral training in England, which was rated somewhat lower than the postdoctoral training of the excellent applicant. Therefore, for purposes of comparison, the excellent applicant is considered superior (and thus labeled) in the following discussion. The results, although not statistically significant, showed definite trends that confirm our hypotheses that discrimination against women does exist at the time of the hiring decision.

Comparison of responses to the varying quality résumés yielded results which showed a definite tendency for the chairmen to prefer an average male over an average female, but to recognize a superior woman. Specifically, of the two identical average applicants, the male was consistently rated higher on educational background and was more often considered positively for hiring. It is noteworthy that the identical résumés of male and female applicants conveyed the same general impression, yet on

these more specific questions concerning education and hiring, the male was evaluated higher. As expected, the opposite tendency was found when the average male was compared to the superior woman. These results also held for the question concerning changes in responses if the résumé had come unsolicited—the chairmen were more inclined to change their minds on the average woman as opposed to the average man, but less likely to alter their responses on the superior woman in comparison with the average man.

The survey population was classified by geographical areas to test the belief that overall conservatism (viewed politically) might be a variable in the discrimination against women. Consequently, the chairmen were divided into two categories: east and west (considered to be more liberal) and middle west and south (considered to be more conservative). Chairmen from schools located in the east and west tended to evaluate the average male applicant higher than they did his female counterpart; no such distinction was evident in the responses of the chairmen from the middle west and south. Furthermore, although both groups of chairmen rated the superior woman higher than the average man, the differences were less pronounced in the responses of the chairmen from the eastern and western schools. Although not statistically significant, these findings indicate that political conservatism as we defined it is not an explanatory factor.

Departments in the survey population were ranked as to quality and classified into groups above and below the median (18). Analysis of the responses of chairmen from departments ranked above the median shows that, in the comparison of the identical average résumés, the male applicant was rated higher than the woman with the same qualifications. No difference was found in the responses from the chairmen from schools ranked below the median in quality. The superior woman was generally evaluated higher by respondents, but more so by the chairman from the lower-ranked schools. This may be because schools in this category receive fewer higher-quality applications. Somewhat surprisingly, the chairmen from the high-quality schools were more inclined to alter their responses concerning the superior woman, which implies that a recommendation from a trusted colleague is a more important factor to

them than it is to chairmen from lower-ranked schools.

In order to determine whether the age of the chairmen might affect their responses, the respondents were divided into two age categories. In the comparison of the identical résumés, the younger group, surprisingly, evaluated the average male applicant higher than they did his female counterpart. The two applicants, however, were evaluated essentially equally by the older chairmen. When comparing the superior female applicant and the average male, the younger chairmen were more likely to recognize the female's qualifications and were more inclined to hire her. On the other hand, the younger chairmen also indicated a greater tendency to change their responses had the résumé come unsolicited.

It was also hypothesized that responses categorized in terms of the tenure of the respondent as chairman of his department would follow the same pattern as the data classified by age; the analysis confirmed this expectation. Those chairmen who were relatively new in their positions were more inclined to be biased against the average female than were those who had been department heads for a relatively longer period of time. In the comparison of the evaluations of the superior woman's résumé with that of the average man, it was found that both newer and older chairmen were more generally impressed with the superior female and evaluated her education higher. However, the younger chairmen showed a greater willingness to hire the female applicant, but placed greater weight on the issue of whether or not the application had come from a trusted colleague.

Two other variables were also subject to statistical tests—the size of the present department faculty, and whether or not it already included any female faculty members. The analysis of the responses showed no significant trends, which suggests that the size or the previous hiring of women are not factors in bias against hiring women.

Unsolicited Comments

Surprisingly, a significant number of unsolicited comments were returned with the questionnaires which had accompanied the résumés belonging to women. The chairmen seemed to be

concerned with what the applicant's husband would do if she were hired. They questioned what the applicant would do with her children and what her personality was like. Further, and perhaps most important, concern was expressed over her compatibility with the existing staff and over potential difficulty in fitting in with the present makeup of the department.

Analysis of these comments leads us to the conclusion that women faculty in the physical sciences may be evaluated on the basis of different criteria than are males when they compete for positions in academia. These criteria appear to be based on personal values and attitudes reflecting widely held socially accepted beliefs regarding the role of a woman in the family and the perceived difficulties regarding her compatibility with male colleagues.

Conclusion

Although our study was conducted in only one physical science discipline, and although most of the individual tests did not yield statistically significant differences, the data consistently yielded a trend in the direction of the existence of discrimination against women in academia. This leads us to the tentative conclusion that when two equally qualified applicants are being considered for an academic position, a male would be chosen over a female. However, a woman with clearly superior qualifications, in competition with an average man, is likely to be recognized. The bias seems to hold especially for higher-quality schools, in departments with younger and newer chairmen, and for chairmen from schools located in the eastern and western parts of the country.

The underutilization of potentially qualified women in science represents lost opportunities to society and to science in terms of the overall goal of advancing science. To the extent that the bias reflects strongly held cultural norms, change will come slowly. However, structural changes within the institutions that employ and train women scientists may be achieved sooner through the active intervention of outside agencies, for example, the enforcement by the Department of Health, Education, and Welfare of the Equal Opportunities Act in colleges and universities (19). In addition, such federal grant-awarding agencies as the

National Science Foundation and the National Institutes of Health could be given a mandate to make a special effort to identify and award grants and other forms of recognition to deserving women scientists.

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NEWS AND COMMENT

Vermont: A Small State Faces Up to a Dilemma over Development

Facing a period of substantial growth and intense development in the 1970's, we have the opportunity and hence the obligation to utilize the newer understanding of the science of ecology, and the improved knowledge concerning effective government organization, to provide a uniform, comprehensive approach by state government to assure development without destruction.—From the 1970 report of the Vermont Governor's Commission on the Environment.

Vermont is a relatively lightly populated, largely rural enclave lying between the Washington-New York-Boston megalopolis and its northern outpost, Montreal. The Green Mountains provide Vermont with ski runs in the winter and a scenic backdrop the rest of the year, and have formed a classic barrier to development. Now, however, geoeconomic pressures have grown intense and Vermonters are striving—in the mildly overheated prose of that key report—for "development without destruction."

Vermont's dilemma is exemplified in its experience with environmental and land use legislation. The state legislature, particularly in a prolific 1969-70 session, enacted a body of law that conservationists around the nation have applauded as being as enlightened and comprehensive as any state's. Two pieces of landmark legislation were a land use and development law (Act 250),* which, in effect, imposes state planning authority on major develop-

ment projects, and a law creating a system of effluent charges, which is patterned roughly on water management practices in the Ruhr in Germany. In addition, the legislature in recent years has passed other legislation prohibiting open-dump burning, controlling shoreline and mobile-home development, and tightening regulations on pesticide use. The esthetics of the landscape were also considered in laws regulating billboards and junkyards. A major effort has been made to reorganize state agencies to deal more effectively with the new legislation. But despite this outpouring of legislation, critics are finding fault on the score of implementation, charging the legislature and state officials with underenforcement through underfinancing of technical and policing staff and through "permissive" administration.

For the casual visitor to Vermont, it is a bit difficult to understand the sense of urgency over environmental matters, since the state seems remarkably free of the population pressures and the kinds of pollution afflicting Vermont's neighbors to the south. The statistics appear to bear out this impression: Massachusetts, with a total area of 7800 square miles, has a popu-

lation of 5.7 million, while Vermont, with 9300 square miles, has a population of 444,000, according to the 1970 census. Although Vermont's population rose by only about 55,000 in the 1960's, the increase was nearly five times the increase in the previous 10 years. With the rate of industrialization and the building of "second homes" for out-of-staters bounding upward in the 1960's, it appeared to Vermonters that the 1960's wrought a transformation in the landscape and the economy, and that change was running out of control.

The forces powering growth in Vermont are hardly unique. The extension of the federal interstate highway system and the building of turnpikes in Massachusetts and New York State began the process, and the building of Interstate 91 up the Connecticut River Valley opened southern and eastern Vermont to easy access from the south. Increasing population and affluence in the Northeast, as well as the skiing vogue, have given Vermont an all-season tourist industry and have caused the "second home" to proliferate. Industrial growth is centered in Burlington, the state's largest city in the northwest on Lake Champlain. By the end of the decade, the Burlington metropolitan area had a population of about 100,000, which is small even by the standards of New England cities, but it seemed to have reached critical size and to be exercising strong drawing power on the GE's and IBM's.

The results of development have also been predictable. With expectations primed by federal programs, Vermonters in the 1960's demanded expanded social services and investment in public education—both schools and higher education—also climbed steadily. The boom in the construction of second

* A good description of the land use bill is to be found in a chapter on Vermont in *Managing the Environment: Nine States Look for an Answer*, a report of a study sponsored by the Ford Foundation and directed by Elizabeth Haskell, a fellow of the Smithsonian Institution's Woodrow Wilson International Center in Washington, D.C.